A NEW SPECIES OF TRYPANOSOME OCCURRING IN THE MOUSE *MUS MUSCULUS**

ARTHUR I. KENDALL, PH.D.,
Acting Chief, Board of Health Laboratory, Panama, Isthmian Canal Commission.

WHILE engaged in a study of trypanosomes in rats in Panama, the writer noticed that not only were these animals infected, but that a certain species of mouse, *Mus musculus*, also harbored a trypanosome.

Up to this time mice have not usually been regarded as being naturally infected with trypanosomes, although Dutton and Todd[1] described a parasite in certain mice in Senegambia which is more or less closely related to this class of parasites. Their organism was described in the fresh state only, and according to them had no undulating membrane. With the exception of this organism the writer knows of no trypanosome characteristic for mice as *Tr. Lewisi* is characteristic for rats. This is in a certain way remarkable, placing the mice, as it does, in a rather unique relation to other rodents, most of which harbor organisms which are more or less characteristic for each species or family.

The mouse trypanosome is as a rule slender, more so than *Tr. Lewisi*, having a rather pointed end posteriorly, more attenuated anteriorly. The posterior end is somewhat contractile, so that this portion of the parasite varies slightly in its outline, with a corresponding change in length. This, however, is noticeable only in rare instances particularly when the parasite is beginning to degenerate. The difference in length is very slight, and is of no diagnostic importance.

The organism is about 3 μ in diameter, varying as a rule between 2 and 3.5; the length is quite as variable as that of the rat trypanosome, from 10 to 16 μ. Not infrequently one sees smaller or larger organisms than this, but the forms commonly met with lie within the above limits.

The parasite is elongated, vermiform, with a rather conspicuous,

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[1] *Thompson Yates Laboratory Reports*, 1903, 5, pp. 56, 57.

highly refractile granule near the posterior end, lying apparently near the centrosome, with a less highly refractile body in the center of the organism. The latter is the nucleus, and occupies the greater part of the diameter exclusive of the undulating membrane.

The motility is very great, resembling that of *Tr. Lewisi;* the organism darts across the field in fresh preparations with great speed, and only after two or three hours does it become slowed sufficiently to permit one to observe the morphology of the trypanosome. Coincidently with the slowing of the motility, the character of the motion changes, and becomes serpentine; the organism assumes a rapidly changing succession of forms, resembling greatly the letter S.

Along the free border of the undulating membrane, which is well developed, beginning at the centrosome (visible in well-stained preparations) and terminating 3 or 4 μ anteriorly beyond the parasite, is the flagellum, which is in living specimens always in active motion.

The protoplasm, except for the refractile spot and the nucleus, mentioned above, is homogeneous, even under the highest powers, with an occasional granule. As the parasite becomes exposed to unfavorable conditions, the character changes, and one observes a granulation which increases both in size of the particles and the amount of protoplasm so changed, until finally the whole organism becomes a mass of granules.

Division occurs by a thickening of the parasite, splitting of the centrosome, and the gradual formation of a new organism smaller than the parent, adherent posteriorly for a time precisely as in *Tr. Lewisi.* Transverse division has never been observed.

In well-stained preparations the body of the organism is pale blue, the undulating membrane blue, the flagellum red, centrosome dark red, with the nucleus slightly darker in color than the flagellum. The centrosome is, as a rule, slightly fusiform, with the axis at right angles with the long axis of the parasite. The nucleus is in young forms round, becoming more elongated previous to division. Stained preparations as well as fresh organisms are very similar to the rat trypanosome.

In all the cases observed so far there has not been one that exhibited the phenomenon of agglutination. Various sera, both of

mice infected with this organism, rats infected with *Tr. Lewisi*, and non-infected rats and mice, failed to produce clumping of the parasites. In fact, even with the very large number of rat trypanosomes brought to the laboratory there has not been an instance of agglutination.

This organism is not uncommon in the mice of Panama. It has been observed in six out of 66 live mice, and 42 out of 512 dead mice. There is a tendency toward seasonal distribution, being more common in November and December, the last two months of the rainy season, than in the dry season. The same tendency has been observed here with respect to *Tr. Lewisi*. In fact there is an extremely strong resemblance morphologically between the mouse and rat trypanosome—so great that the only safe differentiation is in the source of the organisms.

The criterion upon which the specificity of this parasite is based is the fact that it never occurs in rats; or, more correctly, we have never been able to infect rats with this organism, although the rat trypanosome has been transmitted from rat to rat without difficulty. The material injected into the rats has been shown microscopically to contain actively motile organisms, and from the last half of a hypodermic syringeful of material, after injecting one rat, a mouse was successfully infected. The rat proved refractory.

Not only are rats refractory to this organism, but mice themselves are very difficult to infect. After repeated trials two mice, previously shown to be free from parasites, were successfully inoculated. In three days after the first appearance of the trypanosomes, although the infection was fairly heavy, the organisms disappeared, and did not reappear for a month, at the end of which time the animal was killed. The blood at this time, as well as the internal organs, was negative, and the blood was non-infective for mice.

The behavior of mice is unique; the animals do not seem to suffer from the trypanosomes, and, aside from a slight depression and slower response to external stimuli, which is scarcely perceptible, the animals appear perfectly normal and healthy. In no case have infected mice died while under our observation, and animals which have been kept a month after the disappearance

of the parasites (which occurs quite as rapidly in naturally infected as laboratory infected animals) have remained perfectly normal.

The specificity of this organism, then, is based upon:

1. Its occurrence in the mouse.
2. Its non-infectiveness for rats, both wild and white.
3. Its unique behavior in infected mice, i. e., rapid disappearance.
4. Its lack of pathogenicity.

The writer proposes to call the organism *Trypanosoma musculi.*

In conclusion the writer wishes to express his thanks to Col. W. C. Gorgas, chief sanitary officer, the officers of the Panama Board of Health, and the director of the Bureau of Animal Industry; the former for material assistance in collecting material, the latter for identifying the species of mouse.